

1 1. A dual-mode UWB and WLAN transceiver comprising:
2 a digital lowpass-shaping filter system coupled
3 to a UWB multichannel PN sequence mapping or a WLAN IFFT
4 and I/Q modulation;
5 a dual-mode sampling frequency rate coupled to a
6 digital-to-analog converter; and
7 a switch to connect from the UWB multichannel PN
8 sequence mapping or the WLAN IFFT and I/Q modulation to the
9 digital lowpass-shaping filter system.
10
11 2. The dual-mode UWB and WLAN transceiver of claim 1
12 wherein said digital lowpass-shaping filter system can be
13 controlled by using said switch to connect said UWB
14 multichannel PN sequence mapping or said WLAN IFFT and I/Q
15 modulation.
16
17 3. The dual-mode UWB and WLAN transceiver of claim 1
18 wherein said digital lowpass-shaping FIR filter system
19 includes:
20 an indoor UWB digital FIR lowpass shaping filter;
21 an outdoor UWB digital FIR lowpass shaping filter;
22 an WLAN digital multistage FIR lowpass shaping filter;
23 and two controllable switches.
24
25 4. The dual-mode UWB and WLAN transceiver of claim 3
26 wherein said digital lowpass-shaping FIR filter system can

27 select to use said indoor UWB digital FIR lowpass shaping
28 filter or said outdoor UWB FIR lowpass shaping filter or
29 said WLAN digital multistage FIR lowpass shaping filter by
30 using said two controllable switches.
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32 5. The dual-mode UWB and WLAN transceiver of claim 3
33 wherein said WLAN digital multistage FIR lowpass shaping
34 filter comprises:

35 a first stage of upsampling by 2 and a WLAN
36 digital 12th enlarged band lowpass shaping FIR filter;
37 and a second stage of upsampling by 12 and a WLAN
38 digital rejected lowpass FIR filter.
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40 6. The dual-mode UWB and WLAN transceiver of claim 5
41 wherein said WLAN digital multistage FIR lowpass shaping
42 filter is a two stage interpolation lowpass shaping FIR
43 filter with upsampling of 24.
44

45 7. The dual-mode UWB and WLAN transceiver of claim 1
46 wherein dual-mode sampling frequency rate includes:

47 a UWB sampling frequency unit;
48 a WLAN sampling frequency unit;
49 a MUX unit; and
50 a selectable unit.
51

52 8. The dual-mode UWB and WLAN transceiver of claim 7
53 wherein said dual-mode sampling frequency rate can be
54 controlled to select either one sampling rate for the UWB
55 mode or other sampling rate for the WLAN mode by using said
56 MUX unit with said selectable unit.

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58 9. The dual-mode UWB and WLAN transceiver of claim 1
59 wherein said only one digital-to-analog converter is needed
60 for the dual-mode UWB and WLAN transmitter.

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62 10. A dual-mode UWB and WLAN multichannel-based
63 multi-carrier comprising:

64 an analog lowpass filter;
65 a multiplier;
66 two MUX units;
67 three commutator units;
68 three selectable multicarrier frequencies; and
69 three switches.

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71 11. The dual-mode UWB and WLAN multichannel-based
72 multi-carrier of claim 10 wherein said multichannel-based
73 multicarrier can select a carrier frequency from either in
74 UWB mode or in WLAN mode by controlling said MUX unit and
75 said switches.

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77 12. The dual-mode UWB and WLAN multichannel-based
78 multi-carrier of claim 10 wherein said only one analog
79 lowpass filter is needed for either UWB transmitter mode or
80 WLAN 802.11a transmitter mode.

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82 13. The dual-mode UWB and WLAN multichannel-based
83 multi-carrier of claim 10 wherein said MUX units and said
84 switch units are programmable controllable.

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86 14. A dual-mode UWB and WLAN communication receiver
87 comprising:
88 an analog-to-digital converter with same sampling
89 frequency rate and same resolution bit;
90 a pre-switch to provide information to a rake
91 receiver or to an I/Q demodulation;
92 a digital receiver filter system to provide
93 information to the pre-switch;
94 a post-switch to provide information to a block
95 de-interleaver; and
96 a de-spreading of PN sequence and de-mapping or a
97 FFT mapping unit to provide information to the post-switch.

98

99 15. The dual-mode UWB and WLAN communication receiver
100 of claim 14 wherein said analog-to-digital converter has
101 the same sampling frequency rate and the same resolution
102 bit for both UWB and WLAN receiver.

103 16. The dual-mode UWB and WLAN communication receiver
104 of claim 14 wherein said pre-switch may be programmable to
105 connect a position with said rake receiver during the UWB
106 mode or to connect a position with said I/Q demodulation
107 during the WLAN mode.

108

109 17. The dual-mode UWB and WLAN communication receiver
110 of claim 14 wherein said post-switch may be programmable to
111 connect a position with said de-spreading of PN sequence
112 and de-mapping during the UWB receiver mode or to connect a
113 position with said FFT mapping during the WLAN receiver
114 mode.

115

116 18. An article comprising a medium for storing
117 instructions that cause a digital signal processor-based
118 dual-mode UWB and WLAN transceiver system to:

119 Selectively set the sampling frequency rate for
120 the digital-to-analog converter during the UWB or WLAN
121 transmitter mode;

122 Selectively set the connection with UWB
123 multichannel PN sequence mapping or the connection with
124 WLAN I/Q modulation and IFFT during the transmitter;

125 Selectively set the digital lowpass-shaping
126 transmitter filter for the indoor UWB, outdoor UWB or WLAN
127 during the transmitter;

128 Selectively set the use of the multicarrier of
129 the UWB or WLAN lower and upper multicarrier during the
130 transmitter;

131 Selectively set the connection with UWB rake
132 receiver or WLAN I/Q demodulation and FFT.

133 Selectively set the no multicarrier for the
134 indoor or outdoor UWB for certain channels.

135

136 19. The article of claim 18 further storing
137 instructions that cause a digital signal processor-based
138 dual-mode UWB and WLAN transmitter system to control the
139 selectable MUX unit to select either the UWB sampling
140 frequency rate for UWB mode or the WLAN sampling frequency
141 rate for WLAN mode to support the digital-to-analog
142 converter.

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144 20. The article of claim 18 further storing
145 instructions that cause digital signal processor-based
146 dual-mode UWB and WLAN transmitter system to control the
147 two switches to connect with UWB baseband functions of the
148 multichannel PN sequence mapping during the UWB mode or to
149 connect with WLAN based functions of the WLAN IFFT and I/Q
150 modulation during the WLAN mode.

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152 21. The article of claim 18 further storing
153 instructions that cause digital signal processor-based

154 dual-mode UWB and WLAN transmitter system to control the
155 two switches to connect with indoor UWB transmitter filter
156 or outdoor UWB transmitter filter or to connect with WLAN
157 multistage transmitter filter.
158

159 22. The article of claim 18 further storing
160 instructions that cause digital signal processor-based
161 dual-mode UWB and WLAN transmitter system to control the
162 MUX unit to select the multicarrier frequencies from the
163 UWB mode or from the WLAN mode.
164

165 23. The article of claim 18 further storing
166 instructions that cause digital signal processor-based
167 dual-mode UWB and WLAN receiver system to control two
168 switches to connect with UWB baseband functions of the rake
169 receiver and de-spread of PN sequence and de-mapping during
170 the UWB mode or to connect with WLAN based functions of the
171 I/Q demodulation and mapping during the WLAN mode.